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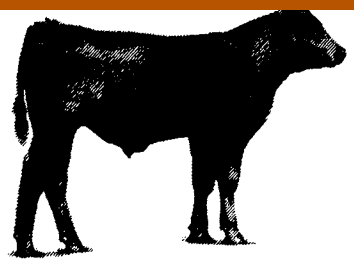

Beef Cattle Management Update

SUGGESTIONS FOR FEEDING HOLSTEIN STEERS IN MINNESOTA

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Historically, many dairy farmers have considered their steers to be a sideline enterprise that required little thought or attention. Traditional cattle feeders avoided Holstein steers for various reasons. However, in recent years, profitability of Holstein steer feeding and lack of profitability in dairying have caused both cattle feeders and dairy farmers to look closer at their Holstein steer nutrition and management programs. The differences among feeders of Holstein steers sometimes seems to be greater than the differences among the steers themselves. Therefore, outlining some fundamentals for success in Holstein steer feeding programs is appropriate.

Approximately 10% of all beef consumed in the U.S. is Holstein beef. Feeding Holstein steers is, and will continue to be an important industry in Minnesota. Minnesota has a steady supply of Holstein bull calves, abundant feed production and storage, feeding facilities, management and labor capabilities and slaughter capacity. Approximately 4 million dairy bull calves are born in the U.S. each year (more than 90% are Holstein). Approximately 400,000 Holstein bull calves are born in Minnesota each year. Typically half of these are exported. Nationwide, about 1/3 of dairy bull calves are fed for veal production. Of the remainder, a few are slaughtered as "bob veal", the rest are fed for beef. Veal production will likely decrease in the future, leaving more calves for beef production.

DIFFERENCES BETWEEN BEEF AND DAIRY FEEDERS

For those with cattle feeding experience, it is important to consider differences between Holstein feeder calves and beef breed steers. These differences can be grouped into genetic differences and differences due to environment and management.

Genetic differences:

- less muscling than beef breeds
- higher maintenance requirements
- less adaptability to environmental stress
  less hair and external fat, thinner hide
- different feed intake patterns
- different fattening patterns
- greater ability to marble with little external fat
- varying susceptibility to feet and leg problems

Differences due to environment:

- "domestication"
  different response to handling and confinement
- greater likelihood of previous nutritional insult
- greater chance of subacute acidosis

FACILITIES AND EQUIPMENT

Because of reduced ability to withstand environmental stress, Holstein steers require greater investment in facilities than beef breed steers. Tables 1-4 describe research conducted on various types of facilities in northern climates. In general, as spending on facilities increases, so does performance. However, not all increases in performance are cost effective.

Beef breed steers will perform well in open lots as long as windbreaks and mounds are provided but performance of Holstein steers will suffer during the winter in these facilities. For optimum performance, Holstein steers should have access to a three sided shed with a roof. While the entire lot does not need to be cement, Holstein steers should be able to get out of mud at all times. Indoor feed bunks seem to improve efficiency approximately 6% and reduce labor required.

NUTRITIONAL PROGRAMS FOR HOLSTEIN STEERS FROM 400 lb TO SLAUGHTER

Typical finishing programs for Holstein steers usually fit one of three descriptions:

- Moderate energy finishing
- Two-phase feeding program
  moderate energy up to 6-700 lb followed by
  high energy diets until slaughter
- Accelerated (high energy) finishing

Moderate energy finishing simply will not be profitable. As described in table 5, use of high silage diets for the entire feeding period will increase both feed and non-feed cost of gain. Since corn is relatively cheap, forage has become somewhat expensive and cattle are relatively expensive, there is little incentive to utilize large quantities of forage in Holstein steer feeding programs. However, Table 5 does describe that including 25, or even 60% corn silage in the diet

can result in decent performance. While not the most ideal program, this is not unacceptable if a producer has large stockpiles of forage.

For most situations, either the two-phase program, or accelerated finishing can be profitable and one of these will usually be the best choice. The two-phase program represents the best means to use significant quantities of forage. In this system, calves are grown as rapidly as possible to 350-400 lb (or purchased at that weight). Beginning when calves weigh 350-400 lb, a diet containing up to 50% forage is fed for about 120 days. During this period, calves gain 2.2-2.5 lb/d. Feed conversion during this period should be 4-4.5/1. At 600-650 lb, calves are placed on high energy finishing diets and should gain 3.0 lb/d until slaughter.

Two important rules for success with the two-phase system. First, forage quality during the growing period must be good. Whether corn silage, hay or haylage is used, only high quality forage will support adequate rates of growth. Calves are selective eaters and will refuse, or underconsume poor or out of condition forage. Second, limit forage to 50% of the diet. The bottom line is that calves must gain at least 2 lb/d during the growing period. If performance falls below this level, interest cost (never forget, you are paying interest whether you borrowed money or not) and cost of facilities, equipment and labor will become prohibitive.

Accelerated finishing simply means that 350-400 lb calves are placed on high energy finishing diets and grown as rapidly as possible until slaughter. Average daily gain from 400 lb to slaughter should be 2.8 lb/d or higher. Accelerated finishing will produce finished steers 60 days faster than the two-phase system and is always the most biologically efficient system (lifetime feed conversion is best). This may or may not be the most economically efficient system.

The two-phase system has three distinct biological advantages over accelerated finishing. First, this system offers the opportunity to utilize forage to a greater extent. Second, since cattle are fed finishing diets for a shorter period of time, there is reduced potential for subclinical acidosis. Third, because cattle finished under the two-phase system are older at slaughter, they seem to have more marbling than cattle finished under the accelerated system. In addition, the two-phase system offers more marketing, purchasing and cropping alternatives. On the other hand, because of increased forage use, enterprise needs for feed harvest, storage and handling equipment are greater.

Regardless of which finishing program is chosen, excellent bunk management (the authors prefer to call it intake management) is a must for success. For more information, see Beef Cattle Management Update #12 "Feedbunk management for maximum intake."

FINISHING DIETS

Finishing diets for Holstein steers need not be complicated. From 600 lb on, the steer requires a diet containing 11-12% crude protein, .5-.6% calcium and .4% phosphorus. While these values exceed published requirements, variation in intake and individual requirements dictate feeding at these levels.

The standard Minnesota feedlot diet consists of 80% (DM basis) corn and 20% corn silage, fed with 1 lb of a protein/vitamin/mineral supplement. The supplement will also provide an ionophore and a subtherapeutic antibiotic to reduce liver abscesses. As simple as it is to describe, this is a difficult diet to improve. Considerable research has investigated other forage sources but corn silage is the forage of choice with corn, especially dry corn.

Recent research has shown that mixing slowly and rapidly degradable energy sources can improve feed intake and conversion. The ideal mix seems to be approximately 2/3 rapidly degradable energy source (ground corn, processed wheat, milo or barley, or cracked or rolled high moisture corn) and 1/3 slowly degradable grain (whole or minimally processed dry corn, whole high moisture corn). For Minnesota feeders, a diet containing 2/3 (of the grain portion) high moisture corn and 1/3 dry corn, along with 20% corn silage, is an excellent choice.

Because Holstein steers are on feed for long periods of time, often as many as 300 days, this program can be tailored to fit their needs. Research has shown that lighter cattle (350-700 lb) will consume more high moisture corn than they will dry corn. During this period, high moisture corn produces the most rapid gains. However, extended feeding periods with high moisture corn as the primary energy source are likely to produce undesirable levels of acidosis because of high intake and rapid degradability. For this reason, and since heavier cattle consume dry and high moisture corn equally, diets should be changed to include higher levels of dry corn as the feeding period lengthens. The best program seems to be 2/3 high moisture corn until 700 lb, then a gradual switch to 2/3 whole dry corn. Because of slow degradability, whole dry corn will reduce the chance of acidosis in long-fed cattle. In addition, the change in the diet seems to relieve boredom and stimulate intake in cattle than are on feed for 240 or more days.

While the 80/20 diet is standard in Minnesota feedlots, it is less common with feeders of Holstein steers. Feeding 100% concentrate diets, usually whole corn and supplement pellets, is common. Self-feeders are used in this system instead of feeding in bunks. Feeders should be aware that this system can produce good, but not maximum gains. Addition of roughage to the diet increases intake and reduces the chance of metabolic disorders such as acidosis. Feeding zero roughage diets increases risk, as does any means to increase the energy density of the diet. The reasons to utilize self-feeders and zero roughage diets are not nutritional, they are related to labor and time management.

IMPLANT PROGRAMS FOR HOLSTEIN STEERS

Holstein steers should always be implanted, unless a producer is receiving a substantial premium for direct marketed beef from nonimplanted cattle. Although data are not conclusive, it appears that steers should be implanted three times from 200 lb to slaughter. Steers that are purchased as 4-500 lb feeder should be implanted twice. Failure to reimplant calves that are fed 150 days or more will result in 20-30 lb of marketable weight foregone.

No steer requires greater muscle enhancement than a Holstein and therefore Holstein steers should be given the most potent implants available, trenbolone acetate plus estradiol (TBA+E; Compudose, Synovex-S or Steer-oid, implanted in combination with Finaplix). On the other

hand, since Holstein steers have limited genetic capability to deposit muscle, they may be unable to respond to TBA+E and should be implanted only with estrogen (Compudose, Ralgro, Steer-oid or Synovex-S).

It is the view of the authors that the truth lies somewhere between the absolutes of always and never. Please consider that the following strategy is based on large doses of theory and interpretation and only small doses of experimental data. Thus, as more data become available, recommendations may change.

TBA+E should not be used in high silage, moderate growth rate finishing programs. If Holstein steers are fed diets containing less than 85% concentrate, they will not grow rapidly enough to deposit the muscle that TBA+E will dictate and also deposit fat at a sufficient rate to attain choice marbling. These cattle should be implanted with estrogen alone, the source of estrogen is relatively unimportant in this case, at approximately 100 day intervals (unless Compudose, which lasts approximately 160 days, is used).

On the other hand, high intake Holsteins that are fed high concentrate diets seem to respond to TBA+E in most cases. If TBA+E is used in Holsteins, it should only be used as the terminal implant and used only one time. Holstein steers that are on a high energy diet and are slaughtered at approximately 400 days of age should probably be implanted three times in their lifetime. The most efficient program would be to implant with estrogen when steers weigh 200 lb (calves do not seem able to respond to implants until several weeks of age), with estrogen again at 5-600 lb, and then with TBA+E 95 days prior to slaughter. If cattle are not eating well, due to genetics, subclinical acidosis, weather stress, facility stress, or any other reason, the final implant should be estrogen alone. If cattle within a group vary widely in size and will be marketed over a period of time, the final implant should be estrogen alone. On the other hand, if cattle are eating well, and marketing can be timed closely, TBA+E will increase growth rate over estrogen alone, with little risk of grading problems.

SUGGESTIONS FOR FINISHING HOLSTEIN STEERS

- Feed uniform groups
- Aim for high growth
- Study marketing alternatives
- Use urea after 400 lb
- Use implants and ionophores
- Work at bunk management
- Protect steers from environment
- Maintain a good health program
- Keep accurate and complete records

TABLE 1. COMPARISON OF VARIOUS TYPES OF FEEDLOT FACILITIES

Capital requirement ($/unit of capacity)	Cattle density sq ft/animal	Frequency of manure handling	Convenience[a]	Flexibility[b]
Outside lots, fenceline feedbunks, concrete apron, mounds and windbreaks				
75-125	200-400	seldom	poor	high
Concrete lots with partial shelter				
150-200	20 inside 30 outside	often	good	medium
Cold confinement, concrete floor				
225-275	25-30	often	good	low
Cold confinement, slotted floor				
300-350	15-20	seldom	excellent	low

[a] Convenience refers to ease of cleaning, cattle movement, etc.
[b] Flexibility refers to option to utilize facilities at any given time based on current markets.

TABLE 2. PERFORMANCE OF STEER CALVES FED IN VARIOUS HOUSING SYSTEMS

	Housing system				
Item	Conventional	Manure scrape	Cold slot	Warm slot	Open lot
No. of steers	536	403	451	682	328
No. of pens	14	14	14	14	11
Initial wt, lb	438	440	442	436	444
Final wt, lb	1015	1042	1033	1029	1016
Daily gain, lb	2.44[a]	2.54[b]	2.48[a,b]	2.49[a,b]	2.41[a]
Dry matter intake, lb/d	15.07	15.20	15.11	15.09	15.25
Feed/100 lb gain, lb DM	618[b]	599[c]	609[b,c]	606[b,c]	633[a]
Carcass characteristics					
Marbling score	SL+	SL+	SL+	SL+	Sm-
KHP, %	2.98[a]	3.03[a,b]	3.11[b]	3.09[b]	2.96[a]
Rib eye area, sq in	11.5[b]	11.3[a]	11.5[b]	11.5[b]	11.2[a]
Fat depth, in	.61[a]	.67[a,b]	.66[b]	.68[b]	.59[a]
Quality grade	Gd+	Gd+	Gd+	Gd+	Gd+
Yield grade	3.4[a]	3.6[b]	3.6[b]	3.6[b]	3.4[a]

[a,b,c] Means in a row with difference superscripts differ (P<.05).

TABLE 3. COMPARISON OF CATTLE PERFORMANCE IN OUTSIDE LOTS VS COLD CONFINEMENT SLOTTED FLOOR FACILITIES DURING WINTER AND SUMMER

	Open lot		Slotted floor	
	Summer	Winter	Summer	Winter
Iowa, 1970-71				
No. of cattle	1313	1438	1254	1035
Days on feed	117	104	117	104
ADG, lb/d	2.96	2.51	2.88	2.60
DMI, lb/d	21.5	23.0	20.0	20.5
Feed/gain	7.31	10.40	6.97	8.38
Dressing percent	62.5	63.0	62.9	63.4
Yield grade	2.35	2.37	2.52	2.31
Feed cost/cwt, $	19.16	26.49	18.19	22.09
Non-feed cost/cwt, $	3.21	4.16	4.69	5.38
Total cost/cwt, $	22.38	30.65	22.89	27.47
Nebraska, 1973				
No. of cattle	188	189	189	192
Days on feed	155	161	155	161
ADG, lb/d	2.45	1.97	2.37	2.07
DMI, lb/d	19.2	15.4	18.8	13.8
Feed/gain	7.94	7.82	7.97	6.65
Dressing percent	59.7	60.7	61.2	62.2
Missouri, 1987				
No. of cattle	8850	11693	5020	7622
Days on feed	121	122	116	114
ADG, lb/d	3.09	2.84	2.71	2.81
DMI, lb/d	20.8	21.6	19.70	20.4
Feed/gain	6.73	7.60	7.28	7.26
Feed cost/cwt, $	46.00	49.00	49.00	47.00
Non-feed cost/cwt, $	4.00	4.00	7.00	6.00
Total cost/cwt, $	50.00	53.00	56.00	53.00

TABLE 4. ECONOMIC COMPARISON OF THE FIVE HOUSING SYSTEMS IN THE MINNESOTA STUDIES

300 head capacity	Open lot	Manure scrape	Conventional	Cold slot	Warm slot
Head fed annually[a]	438	465	444	450	459
Labor, hrs/head	2.30	2.39	2.40	2.12	2.12
Capital, $/head capacity					
Lot & shelter	$107.33	$220.83	$193.33	$316.67	$470.00
Waste handling	31.15	9.45	26.81	24.26	24.26
Feed storage & handling	146.30	146.30	146.30	146.30	146.30
Total	$284.78	$376.58	$366.44	$487.23	$640.56
Cost, $/100 lb gain					
Facilities @ 25.5% ann.[b]	$ 9.10	$ 11.34	$ 11.55	$ 15.16	$ 19.54
Labor @ 5.00/hr	1.92	2.00	2.00	1.75	1.75
Bedding[c]	3.99	4.82	4.45	0	0
Interest on animal[d]	5.82	5.48	5.74	5.67	5.56
Insurance & utilities	.46	.46	.46	.46	1.40
Veterinary & medicine	1.25	1.25	1.25	1.25	1.25
Death loss[e]	.54	.54	.54	.54	.54
Trucking	3.00	3.00	3.00	3.00	3.00
Non-feed total	$ 26.08	$ 28.89	$ 28.99	$ 27.83	$ 33.04
Feed cost[f]	25.32	23.96	24.72	24.36	24.24
Total	$ 51.40	$ 52.85	$ 53.71	$ 52.19	$ 57.28
Total capital investment ($)	80,283	102,375	100,653	130,968	169,609
Total labor required (hrs)	1,007	1,111	1,066	954	973

[a] Based on 5 year average daily gains, in Minnesota research, 600 lb gain, (1.46, 1.55, 1.48, 1.50, 1.53 turnovers annually in open lot, manure scrape, conventional, cold slot and warm slot, respectively).

[b] (Depreciation, 10.00%; Interest, 12%; Repairs, 5.0%; Taxes, .5%; Insurance, .5%) x initial capital investment - turnovers/yr - 6 cwt.

[c] Bedding @ $85/ton.

[d] Interest, 12% annual, $425.00 purchase price, (250, 235, 247, 243, 239 days for open lot, manure scrape, conventional, cold slot and warm slot, respectively).

[e] Death loss calculated at 2% of initial cost.

[f] Feed costs: HM corn @ $.04/lb, corn silage @ $.025/lb, supplement @ $.11/lb; total ration cost, $80.00/ton of dry matter.

TABLE 5. THE EFFECT OF DIETS WITH VARYING ENERGY DENSITY ON FINISHING HOLSTEIN STEERS, Minnesota

Item	90	60	25	5
	---------- Percentage of corn silage in diet ----------			
ADG, lb	2.47	2.91	3.26	3.50
Days on feed	244	206	184	171
Feed/gain	7.96	6.68	5.80	5.17
	---------- Costs, $/cwt of gain ----------			
Feed	35.98	32.56	32.87	30.66
Nonfeed	16.27	13.73	12.27	11.33
Total	52.25	46.29	45.14	41.99

Steers fed from 500 lb to 1100 lb.

TABLE 6. EXPECTED PERFORMANCE OF HOLSTEIN STEERS AT VARIOUS WEIGHTS, Minnesota

Weight, lb	ADG, lb	ADFI, lb	Feed/gain
4 to 500	3.16	14.2	4.48
5 to 600	3.14	15.1	4.82
6 to 700	3.08	16.5	5.37
7 to 800	2.99	18.4	6.14
8 to 900	2.87	20.5	7.13
9 to 1000	2.72	22.6	8.32
10 to 1100	2.53	24.6	9.73
11 to 1200	2.31	26.2	11.36

TABLE 7. USE OF ALFALFA HAYLAGE DURING THE GROWER PHASE, Cornell

Item	% haylage during grower phase 50	30	10
	---------- Grower phase ----------		
End wt, lb	592	614	639
ADG, lb	2.52	2.77	3.05
Feed/gain	5.09	4.72	4.45
	------- Grower and finisher phase --------		
End wt, lb	1143	1134	1155
ADG, lb	2.75	2.79	2.80
Feed/gain	6.22	5.87	6.02

Initial wt = 344 lb.

TABLE 8. GROWTH IMPLANTS FOR HOLSTEIN STEERS, Cornell

Item	Control	Implanted
	---------- Grower phase ----------	
End wt, lb	603	626
ADG, lb	2.66	2.90
Feed/gain	4.95	4.55
	---- Grower and finisher phase -----	
End wt, lb	1162	1126
ADG, lb	2.57	2.98
Feed/gain	6.37	5.70

Initial wt = 344 lb, steers were implanted with Ralgro during grower phase and with Revalor during finishing phase.

TABLE 9. SIMULATED EFFECTS OF IONOPHORES ON HOLSTEIN STEERS, Minnesota

Item	None	Monensin	Ionophore Lasalocid
ADG	100	99	104
ADFI	100	89	98
Feed/gain	100	91	95